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SOCIAL AND ECONOMIC CHARACTERISTICS OF THE COLLEGE POPULATION AND OTHERS WITH SOME COLLEGE TRAINING.

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RESEARCH WAS DIRECTED TOWARD ANSWERING THE FOLLOWING THREE QUESTIONS--(1) WHO IS NOT GOING TO COLLEGE AND WHO IS LIKELY TO GO IN THE FUTURE, (2) WHAT MAY BE THE COLLEGE ENROLLMENT BY 1975, AND (3) TO WHAT EXTENT DOES MODERN TECHNOLOGY REQUIRE INCREASED EDUCATION ON THE PART OF THE WORKERS. ALL ANALYSES WERE BASED ON DATA ALREADY COLLECTED BY THE U.S. CENSUS BUREAU, THE OFFICE OF EDUCATION, OR PRIVATE SURVEY FILMS. THE DATA WERE ANALYZED USING REGULAR DEMOGRAPHIC METHODS (AS DESCRIBED IN A.J. JAFFE, "HANDBOOK OF STATISTICAL METHODS FOR DEMOGRAPHERS"). CONSIDERABLE USE WAS MADE OF THE 1960 CENSUS OF POPULATION, ESPECIALLY THE VOLUME, "EDUCATIONAL ATTAINMENT," AND THE ONE-IN-A-THOUSAND TAPE (SOLD BY THE CENSUS BUREAU) WHICH WAS TABULATED ON A COMPUTER. MAJOR CONCLUSIONS WERE--(1) BY 1975, THE ANNUAL ENROLLMENT OF HIGH SCHOOL GRADUATES COULD BE ABOUT 3 MILLION, FIRST-TIME STUDENTS ENROLLED IN 4-YEAR COLLEGES ABOUT 1.1 MILLION, AND TOTAL ENROLLMENT IN 4-YEAR COLLEGES ABOUT 5 MILLION, (2) IT IS DIFFICULT, IF NOT IMPOSSIBLE, TO ESTIMATE 1975 ENROLLMENT IN 2-YEAR INSTITUTIONS BECAUSE OF THEIR OPEN DOOR POLICY, (3) TECHNOLOGICAL CHANGE DOES NOT AUTOMATICALLY REQUIRE WORKERS TO HAVE ADDITIONAL FORMAL SCHOOLING, AND (4) GRADUATION FROM HIGH SCHOOL WILL NOT AUTOMATICALLY GUARANTEE EMPLOYMENT FOR JOB SEEKERS WHEN JOB SHORTAGES EXIST. (JC)

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Cooperative Research Project No. 1269

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4. Problems on which the research was focused.

There are two closely related problems which, for the sake of simplicity, we present separately. The problems are interrelated from the viewpoint of both method and content.

1. Persons with some college training--i.e., persons who had only from one to three years of college--both recently and in the past. Apparently nearly half of all persons who begin college terminate their studies some time before obtaining a bachelor's or first professional degree. At first glance this would seem to imply a considerable amount of wasted time, effort, and expenditures both on the part of the institutions of higher learning and on the part of the students. This raises the question: how do the post-college experiences of these persons compare with persons who completed four years of college?

2. Historical trends in, and new projections of, college enrollment. The aim is to make new projections to 1975, using knowledge about past trends in and attitudes toward college going. We shall try to treat enrollment in two-year and four-year colleges separately.

5. Objectives.

Persons with some college training. By studying persons enumerated in the 1960 population census who have completed one to three years of college and were not attending school at the time of the 1960 enumeration, considerable information can be obtained about persons who began college but did not receive a baccalaureate. These persons are then compared with those who completed four or more years of college.

The persons who have had only some college training consist of several types: those who only attended and graduated from a junior or technical

college of less than four years' duration, those who began but did not finish such junior colleges, those who graduated from such junior colleges and went on to regular college but failed to obtain a baccalaureate, and those who began but did not finish a regular four-year college program leading to a baccalaureate. Although the census returns do not distinguish among these types, we have reason to believe that the majority of persons with but one to three years of college are actually persons who failed to obtain either an A.A. or A.B. (or equivalent) degree. We deduce this from the following information. a) During the mid-1950s enrollment in junior colleges constituted but 13 per cent of all enrollment in higher education (Statistical Summary of Education: 1955-56, Office of Education, p. 79). b) At the time of World War II junior college enrollment was considerably less and constituted some 9 per cent of all enrollment in higher education, and in earlier years even less. c) Perhaps not over half of all persons who begin a four-year college course actually graduate (R. E. Iffert, Retention and Withdrawal of College Students, Office of Education, Bull. 1958, No. 1, Table 9). d) Perhaps only about one-quarter of the students who enter junior college graduate (W. C. Eels, "Student Mortality in Junior Colleges," Junior College Journal, Vol. 27, No. 132).

The period in which these people left college can be ascertained approximately from the age of the person; for example, a person aged 30 to 34 years in 1960 must have left college around 1950. We can then describe the persons having only some college training in each time period (e.g., before 1925, 1925 to 1929, 1930 to 1934, etc.) according to their various social and economic characteristics: sex, ethnic background, geographic origin, marital and family status, occupation, industry, earnings, etc.

By using statistics from earlier censuses and from the Current Population Survey, trends in some of these characteristics can be determined.

Furthermore, the relationship between amount of education, particularly college education, and changes in output per worker (sometimes called "automation") during the 1950s will be studied. For this purpose we have samples of the 1950 and 1960 censuses (described more fully in section 7, Procedure) from which we can obtain tabulations of education by industry. We also have measures of changes in output per worker during the 1950s for the same industries. Accordingly, we can determine how the educational level of the working force might be related to changing technology.

As an example of the type of fact that may emerge from such an analysis, we know (from the 1950 census) that men with one to three years of college earned, on the average, very little more than did men who graduated from high school. However, men who graduated from college earned considerably more than did those with only some college training. What changes in this pattern, if any, occurred since 1950?

Projected college enrollment to 1970 and 1975. We shall try to make such projections separately for enrollment in two-year colleges and in four-year colleges and universities. Using the 1960 census data on the educational distribution of the population by age (as described in the preceding section), we can ascertain long-time trends in the population of high school graduates who then enroll in college and subsequently finish four or more years. These historical trends will be available by sex, color and ethnic composition (in addition to age).

The methodology will then consist basically of component analysis, i.e., analyzing separately the several age, sex, color, etc., groups and obtaining the totality as a sum of the components. In addition to the data from the

1960 census, data from the Census Current Population Survey and the Office of Education will be used in an effort to carry the historical data beyond 1960. Furthermore, we have good estimates of the age distribution of the population to 1975; this permits better estimates of the numbers expected to graduate from high school and, in turn, better estimates of the numbers expected to enroll in college.

In addition, the data on attitudes and plans of parents and children with regard to the children's going to college will be analyzed carefully to determine what long-time trends there may be in the attitudes of the public. These data are available at the Roper Public Opinion Research Center at Williams College, Williamstown, Mass. By attempting to relate the attitudes of parents and high school students, together with actual historical trends in college enrollment, we expect that much better predictions can be made to 1975.

Finally, in an effort to cast more light on future enrollment in two-year vs. four-year institutions, we shall try to analyze the personal and social characteristics of those who enroll in each type. Combining such information (available from census and private surveys) with data on the past and present geographic distribution of enrollment in the two types of institutions, will help in projecting enrollment in the two types separately.

6. Related research.

Obviously, a considerable quantity of research has been conducted on the various problems we have listed. For example, a recent National Opinion Research Center study dealt with the financing of graduate study; Gary S. Becker attempted to measure the economic value of a college education (The American Economic Review, May, 1960); the working force experiences of

persons attending college have been reported by A. Katz ("The Employment of Students, October 1959," Monthly Labor Review, June, 1960); Robert E. Iffert studied college drop-outs in Retention and Withdrawal of College Students (Office of Education, Bull. 1958, No. 1); Ernest V. Hollis reported on Costs of Attending College (Office of Education, Bull. 1957, No. 9); etc.

These and other research findings provide highly useful information for the attempted solution of many of the current problems in the field of higher education. We wish to make additional contributions from new and major sources of information not yet utilized, namely, the 1960 U. S. Census of Population, the Census Bureau's Current Population Survey, Office of Education data for the last few years, and the private survey data available at the Roper Public Opinion Research Center. The Census Bureau, through both the decennial censuses and the Current Population Survey, provides information for the entire country, and not simply a sample of institutions; furthermore, it provides more current information than was available for any of the studies previously mentioned.

The Social Science Research Council in its 1960 census monograph program includes the subject of education in the United States. This appears to be a broad scale survey covering all levels of education and does not promise to provide nearly all the information on higher education which can be obtained from the 1960 census schedules, the Current Population Survey, and the private survey data, if properly utilized.

7. Procedure.

Basically the procedure contemplates making full use of the large amount of data from the 1960 population census on the population, classified by educational level and other characteristics. In addition, we have samples

of the 1960 and 1950 population censuses. The 1960 sample is the one-in-a-thousand tape which we purchased from the Census Bureau; the 1950 sample is on punch cards and is also one-in-a-thousand. With these two samples and the use of F. F. Stephan's adjustment procedures (W. E. Deming, Statistical Adjustment of Data, New York: John Wiley & Sons, 1943, Chapter VII) which we have programmed for the 7094 computer, we can make a large number of additional tabulations of the two censuses, i.e., tabulations which the Census Bureau did not make. These samples will be particularly useful for studying the relationship of education to industrial composition and technological change since at no time has the Census Bureau tabulated employed persons by industry and educational level.

We can, for example, study the educational level of managers and officials (excluding farmers). This will provide information on the following questions: The median number of years of schooling of men employed as managers in 1960 was 12½ years: this means that the "typical" manager only went to college for a half year. However, this also means that many managers had more than 12½ years of schooling, whereas others have completed less than this. Therefore we ask, in what kinds of industries, apparently, are college graduates employed as managers, what kinds of industries use persons who had some college but are not graduates, and what kinds of industries use as managers persons who have had only high school education or even less? Reversing this question, we may ask, for example, if by any chance persons with four or more years of college become managers in the fast growing industries, whereas those with less schooling can obtain jobs only in stationary or declining industries.

Answers to these and related questions will come from the samples which we have of the 1950 and 1960 censuses.

The end product, then, will consist of a series of articles (eventually to be combined into a single volume), presenting the results of the analyses, together with a new set of projections of college enrollment to 1975.

8. Analyses of the data and findings.

Six articles have been prepared, four of which have been published. Definitive arrangements for publication of the other two have not yet been completed.

Three of the published articles are concerned with the general question of trends in college enrollment. These may be summarized as follows.

College Education for U. S. Youth:
Attitudes of Parents and Children*

1) How do the attitudes and plans of parents and children differ with regard to children's college attendance?

The first observation is that virtually all parents today want their children to go to college.

Secondly, we observe that the parents are far more optimistic than are the children about going to college. Perhaps some parents blindly overestimate the abilities of their children; perhaps other parents, realizing that there should be an economic and social advantage in attending college, plan for their children to go; perhaps other parents are trying to fulfill their own wishes to attend college through their children; perhaps other factors are operating. In any event, significantly more of the parents plan on college attendance for their children than do the high school students themselves.

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*Published in American Journal of Economics and Sociology, Vol. 23, No. 3, July, 1964, pp. 269-83.

2) How do the attitudes and intentions of parents and children as of around 1960 compare with those held just prior to the outbreak of World War II?

Between 1939 and 1959 the intentions of the parents with regard to sending their children to college rose more rapidly than did the intentions of the high school students themselves. In 1939, 57 per cent of parents intended to send their children to college, as compared with 72 per cent in 1959; this is an increase of about a quarter. Among students of high school age the proportions intending to go on to college increased from 40 to 47 per cent, or about a sixth.

3) What class differences are there in these attitudes and intentions as of around 1960 and in comparison with two decades earlier?

Class differences (measured by the occupational position of the head of the household) with regard to college intentions of parents and children and actual college enrollment seem to have remained largely unchanged during this same period (approximately 1939-59). In the earlier period, as well as in the later period, much larger proportions of white-collar families planned for children to attend college, and much larger proportions did enroll than among manual or farm families.

Notes on College Attendance - From Grandfather to Grandson*

Throughout the period from the latter part of the nineteenth century to around 1960, we find that the proportion of male high school graduates who went on to college has hovered around 50 per cent. This was true of the great grandfather generation which was of high school graduation age around 1870, and of their great grandsons who were of high school graduation age

*Published in The Statistical News, Vol. 15, No. V, January, 1964.

around 1960. However, the proportions who graduated from high school rose greatly from about 10 per cent in the great grandfather generation to over 60 per cent among the great grandsons. The data are as follows:

Generation	Age	% who graduated from high school	% of HS grads who entered college	% of college entrees who graduated
Great grandfathers	75+ (1940)	10	52	52
Grandfathers	60-64 (1940)	15	51	54
Fathers	50-54 (1960)	32	50	51
Older sons	25-29 (1960)	60	46-47	53-54
Younger sons	20-24 (1960)	62-63	45-50	55-60

The above estimates can be brought more nearly up to date by noting that among the boys who graduated from high school in June 1960, 46 per cent had enrolled in a college in October of that year. Since some will enter college several years after high school graduation, we can assume that between 50 and 55 per cent eventually will enter college.

It is also clear that among those men who entered college, about half completed four years or more; this was true of all generations. It is possible that among the sons as many as 60 per cent may eventually complete this much college education. However, we shall not know definitely until the 1970 Decennial Census is taken.

Trends in College Enrollment*

This article presents considerable additional detail on trends in college enrollment. Perhaps the most important and unexpected findings are that, generation after generation:

Roughly half of all the white men who graduate from high school go on to college.

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*Published in College Board Review, No. 55, Winter 1964-65, pp. 27-31.

Roughly 4 in 10 white women and nonwhite students who graduate from high school go on to college.

About half of those who enter four-year colleges complete the four years of study.

These contradict some popular assumptions. One assumption is that a larger proportion of high school graduates now goes on to college. We find, on the contrary, that the proportion continues to be the same.

Another popular assumption is that a higher proportion of college students now fails to finish four years. We find that slightly over half the men are receiving their degrees and about 4 in 10 women are completing four years. These proportions continue long-standing trends.

Clearly, the bulge in college applicants has resulted solely from the larger number of youngsters in these age groups and the larger proportion who graduate from high school.

Another piece, as yet unpublished, is concerned with the question of who are the two- and four-year college students. This is reproduced below.

Who Are the Two- vs. Four-Year College Entrants?

Introduction

Problem

In recent years there has been a large and accelerating growth in two-year college enrollments. In 1940 such enrollments comprised just 10 per cent of all college students; by 1962 this proportion had increased to 14 per cent. Present trends suggest that in the future two-year college students will represent an even larger proportion. Two-year colleges are significantly different from four-year colleges and universities. The two types of schools do not offer identical academic material. They do not enroll the same type of student. In consequence their graduates are in no sense identical. Bearing this in mind, we may ask whether or not the United States is developing a dual system of higher education to the extent that the term "college" is no longer appropriate (if it ever was) as a general term for post-high school education.

In this paper we propose to examine some of the characteristics of the students who enroll in two-year as compared with four-year colleges, in an effort to determine just how similar--or just how different--the two student bodies may be. Clearly, if they are extremely different we <u>are</u> justified in speaking of the emergence of a dual system of higher education.

Source of data

In 1960 the U. S. Census Bureau conducted a special inquiry, <u>Factors Related to College Attendance of Farm and Nonfarm High School Graduates: 1960</u>.[1] In 1959 a cross section of U. S. high school seniors had been asked

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[1] James D. Cowhig and Charles B. Nam, <u>Factors Related to College Attendance of Farm and Nonfarm High School Graduates: 1960</u>. Washington: U. S. Bureau of the Census, Series Census-ERS (P-27), No. 32, June 15, 1962.

whether or not they planned to enter college. The students were then followed up to determine how many graduated from high school and how many actually enrolled in college.

For those who enrolled in college in the fall of 1960 it was ascertained whether they had entered a two- or a four-year school. Furthermore, during the course of interviewing the students, considerable background information was obtained about them, including their high school records, IQ scores, types of high school curricula, etc.

From the Census Bureau we obtained special tabulations of the characteristics of those who enrolled in two-year, as compared with four-year, colleges. The characteristics of the high school graduates who failed to enroll in any college were already known, enabling us to compare these two groups, college enrollees and non-enrollees. The findings presented here are almost entirely based on the special census tabulations and the published data on non-entrants to college.

At this point we wish to enter a cautionary word. The number of cases in the cross section were not large, 333 persons who entered four-year colleges, and 96 who entered two-year colleges. In our analysis, then, we speak of the groups as different only when a Chi-square test of significance indicated the probability to be .05 or less that the difference was due to chance alone.

Findings

The findings should be evaluated with the fact in mind that in 1960, of the first-time students enrolling in colleges in the United States, 77 per cent entered four-year and 23 per cent two-year schools.[2] These proportions are almost identical with those for the Census cross section.

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[2] Statistical Abstract of the United States, 1963. Washington: Bureau of the Census, U. S. Department of Commerce, Table No. 177, p. 136.

Background factors

1) Of the high school seniors who said they planned to enter college, and who in fact did so, 8 in 10 enrolled in a four-year college and 2 in 10 in a two-year school. Among those who were undecided about going to college or said they did not plan to enter, but subsequently did enroll, only 6 in 10 entered a four-year college. Presumably these late deciders, in part at least, selected two-year colleges because they were easier to get into at the last moment.

2) Of those high school students who had taken college preparatory courses and subsequently enrolled in college, 84 per cent enrolled in four-year colleges; this compares with 60 per cent among those who had not taken college preparatory courses. There is a relationship between taking college preparatory work and planning on attending college, however,[3] so that these two findings are interrelated. Many late deciders probably had not taken a college preparatory course, and therefore found it more difficult to enter four-year colleges.

3) A larger proportion of rural farm youth who entered college, as compared with non-farm youth, enrolled in a four-year college--90 per cent vs. 75 per cent. In part this may reflect the fact that two-year colleges generally are commuter schools in urban centers, and many farm youths live too far from them to commute; therefore, they go to four-year colleges where there are residence facilities.

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[3] See Cowhig and Nam, op. cit., Table 16; John A. Michael, "High School Climates and Plans for Entering College," Public Opinion Quarterly, Vol. 25, Winter 1961; Natalie Rogoff Ramsøy, Social Structure and College Recruitment, mimeo, Bureau of Applied Social Research, Columbia University, June, 1963; and Martin David, Harvey Brazer, James Morgan, and Wilbur Cohen, Educational Achievement--Its Causes and Effects, Survey Research Center, University of Michigan, Ann Arbor, 1961.

4) A larger proportion of students from households in which the head was a white-collar worker, as compared with students from households of manual workers, enrolled in four-year colleges. The relationship between occupation of the household head and the type of college in which the child enrolled is a rather complicated one, however. A larger proportion of the children of white-collar workers took college preparatory courses and, as we saw previously, a larger proportion of those who took college preparatory courses planned on and subsequently enrolled in four-year colleges.

Furthermore, a larger proportion of those with higher IQ scores took college preparatory courses in high school. Thus we have the complicated relationship: more children in white-collar families (as compared with families of manual workers) had higher IQs,[4] and took college preparatory courses in high school, and planned on going to college, and entered four-year colleges.

The net result of this sequence is that: among those with higher IQs and who took college preparatory courses, and who planned on going to college, the proportion who enrolled in four-year colleges was the same among children of white-collar and manual worker families.

Scholastic abilities

1) Among those who enrolled in college, and who were in the upper half of their school's scholastic standing, about 9 in 10 entered four-year colleges. Among those in the lower half of the scholastic standing only 6 in 10 enrolled in four-year colleges; 4 in 10 entered two-year colleges.

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[4]This relationship may be the result of environmental factors as much as (or even more than) any inherent capabilities. (See also footnote 3 of this article.)

Virtually identical relationships pertained for IQ scores. About half of those in the lower half of the IQ distribution (and who entered college) entered two-year colleges.

2) If we combine scholastic standing and IQ, we find that 75 per cent of those who enrolled in four-year colleges were both in the upper half of the IQ ratings and the upper half of the scholastic standing. Of those who entered junior colleges, only 37 per cent were in this category. (See table below.)

Type of College Entered by Combined Index of IQ and High School Scholastic Standing

Student placed ...	High school graduates who ... entered 4-year colleges	... entered 2-year colleges	... did not enter college
	%	%	%
... in upper half for both IQ and scholastic standing	75	37	29
... in upper half for one measure and lower half for the other	18	35	36
... in lower half for both IQ and scholastic standing	7	28	35
Total	100	100	100

See text for source of data.

At the lower end only 7 per cent of those who enrolled in four-year colleges were in the lower half of the IQ rating and also the lower half of the scholastic standing. Among those who enrolled in two-year colleges, however, 28 per cent were in this category. It is abundantly clear from

these data that the students who enrolled in four-year colleges, by and large, evinced a greater capacity for "book learning" than those who enrolled in two-year colleges. The American four-year college system emphasizes subjects which involve reading and language ability, and measures its teaching success in terms of written examinations. Clearly those best qualified to survive in such an environment tended to enter four-year colleges. Those less qualified tended to enter two-year colleges.

These differences in academic ability between four-year and two-year enrollees were similar to those reported for the State of California. The median aptitude test scores (1952, 1953) were as follows:[5]

Entrants into State University	73
Entrants into State Colleges	48
Entrants into State Junior Colleges	34

(The nationwide median score on this scale was 50.)

3) There was comparatively little difference between the IQ and scholastic ratings of the high school graduates who did not enroll in any college and those who enrolled in two-year colleges. (See table, p. 17.)

4) We are assuming that the best candidates for four-year colleges are those high school graduates who are both in the upper half of the IQ rating and the upper half of scholastic standing. Given this assumption, then it is probable that there are almost as many such students who do not go to four-year colleges as who do go. In 1960 we estimate that the

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[5] These statistics derive from data presented in A Restudy of the Needs of California in Higher Education, California State Department of Education, Sacramento, 1955, pp. 104-108. The tests used were the American Council Psychological Examination (College Edition) and the College Entrance Examination Board Scholastic Aptitude Test, the former for the state and junior colleges, and the latter for the University. Scores were adjusted to reconcile, as much as possible, discrepancies between the two tests.

freshman class in four-year colleges contained about 540,000 persons who had high scholastic abilities.[6] Perhaps another 70,000 students with high abilities enrolled in two-year colleges. Another 400,000 high school graduates with such abilities failed to enroll in any college.[7] An unknown number of students with higher scholastic ability who failed to enter college in 1960 will do so at some future date. We have no reason to believe, however, that any significantly large number will do so.

Implications

A dual college system is clearly emerging. The two-year colleges, which have rapidly growing enrollments, serve students with lower scholastic qualifications than those who go to four-year colleges. We can infer, then, that these two-year college students, in general, cannot cope with the difficult course of study which a student body with higher scholastic abilities finds both viable and profitable and should receive.

Accordingly, we suspect that the tendency observed recently in Florida, and perhaps elsewhere, for every student to pass his first two years at college in two-year schools could only operate disadvantageously for the brighter students.[8] Since the two-year college tends to admit almost all applicants, it would have a very heterogeneous student body. If it were

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[6] There were 714,000 first admissions, 75 per cent of whom had high scholastic abilities (Statistical Abstract of the United States, 1963, op. cit., Table No. 177, p. 136).

[7] A more rigorous assumption is that the "best candidates for four-year college" are those who are both in the upper quarter of the IQ rating and the upper quarter of scholastic standing. On this basis we estimate that in 1960 about 293,000 such students entered four-year colleges; 57,000 entered two-year colleges, and 64,000 failed to enroll in any institution of higher education.

[8] See The Wall Street Journal, December, 1963, "New Florida Schools to Bar Freshmen and Sophomores."

to design its academic program for the scholastically more advanced students, then the less advanced ones would profit little. If it were to dilute the program for the sake of the scholastically less advanced, then the more advanced ones would have no opportunity to develop and use their full intellectual capacities. If it were to attempt to educate the intermediate ability students, this program would still be too advanced for the "slow" students and too elementary for the highly talented students.

Now one of the arguments advanced for having everyone spend his or her first two years at two-year commuter colleges is that such instruction costs less per student than equivalent instruction in a four-year residential college. If cost were to become the main criterion for evaluating or selecting an educational program, then we would suggest that the college system should be abolished altogether, so as to save the seven billions of dollars a year, or more, which we currently spend. If, on the other hand, education to the full capacity of each student were to be the main objective of higher education, then we should best continue, and indeed emphasize, the distinction between the kinds of programs which qualified four-year colleges can offer and those which two-year colleges must necessarily give, considering the differing characteristics of the respective student bodies.

If we are concerned, as we should be, that too many bright persons fail to go to college, then the answer would seem to be to offer them various inducements for entering four-year colleges. If these students are truly talented enough for our society to insist that they should receive a higher education, then the compromise program of a two-year college would probably do scant justice to such abilities.

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The question of the relationship of modern technology to educational attainment is treated in one published and one unpublished piece. The published piece is "Educational Attainment and Modern Technology - A Brief Note" (The Statistical News, Vol. 16, No. IV, December, 1964). The findings are:

Among all male workers in the United States in 1960 over half are "drop outs"--they had not graduated from high school. Among professional workers there were virtually none; among managers and other white-collar workers a little over one-third were not high school graduates; and among manual workers, two-thirds or more were "drop outs." Even among employed craftsmen 65 per cent were "drop outs."

Now how about changes in educational level since 1950, as compared with changes in output per worker? There is little, if any, relationship. In those industries in which output per worker increased by less than 2 per cent annually (and employment increased under 15 per cent), 77 per cent of the employed workers were "drop outs" in 1950, as compared with 72 per cent in 1960. At the other extreme, among those industries in which output per worker increased by 4 per cent or more per year (and employment increased under 15 per cent), the proportion of "drop outs" fell from 83 per cent in 1950 to 76 per cent in 1960.

Analysis of data for specific industries reveals exactly the same lack of relationship. For example, in the industry, "local and highway passenger transportation" in which change in output per worker was less than 1 per cent per year, the proportion of "drop outs" remained unchanged, being 76 per cent in 1950 and 75 per cent in 1960. In "printing, publishing, and allied industries" in which changes in output per worker were between 1 and

2 per cent per year, the proportion of "drop outs" fell from 66 per cent in 1950 to 54 per cent in 1960.

On the other hand, in "coal mining," where change in output per worker was over 5 per cent per year, exactly 87 per cent of the employed workers were "drop outs" in 1950 and 1960. In the "chemical and allied products (manufacturing)" in which change in output per worker was also over 5 per cent per year, 75 per cent of the workers were "drop outs" in 1950 as compared with 59 per cent in 1960.

In summary, among all workers, manual and white-collar, there were increases in educational attainment between 1950 and 1960. Such changes, however, bear little, if any, relationship to changes in output per worker as among the different industries. Furthermore, even in those industries which apparently were undergoing the most rapid technological changes (as measured by changes in output per worker), half or more of the male manual workers were "drop outs." Clearly, these data do not prove that modern advancing technology necessarily requires its workers to have more formal schooling.

The unpublished paper treats this problem in much greater depth. This is reproduced below.

Education and Automation

I. Introduction

Purpose

Much has been written about the "needs" of modern industry for "educated" workers; many writers have implied, if not made explicit, that persons who have failed to graduate from high school do not have the training or capacity for holding down jobs in today's modern technological economy. They are frequently doomed to a life on welfare, or to underemployment, unless they can be retrained and educated.

Our purpose, then, is to determine just how much education--i.e., formal schooling--employed workers had in 1950 and 1960, and to relate such data to technological change, as measured by average annual changes in output per worker during the 1950s. We emphasize that our concern is with the amount of schooling or training needed for the job, rather than with the level of education demanded by employers or personnel men when hiring workers.

We assume that if a man is employed he performs sufficiently well on the job so as to be able to retain it; employers rarely keep workers on the payroll out of a sense of charity. Hence, the amount of schooling which such workers have is a clue to the amount of formal schooling actually needed for the job. Now, if modern technology requires well-educated workers, as some advocates claim, we should find that in those industries in which there have been very great increases in output per worker the educational level of the workers generally should have risen significantly. Conversely, in industries which experienced little, if any, increase in output per worker, presumably there was no "need" for the employed workers to have any increased amount of schooling.

Data and methodology

Information on average annual changes in output per worker during the 1950s, for each of over 60 industries comprising the entire U. S. labor force, was available from an earlier study of ours and was published in the report of the hearings before the Senate Subcommittee on Employment and Manpower of the Committee on Labor and Public Welfare in September, 1963.[1] Data on the educational level of the workers were obtained from one-in-a-thousand sample tapes of the 1950 and 1960 U. S. Population Censuses. We cross-tabulated number of years of schooling completed, by industries classified by changes in output per worker, and by changes in employment between 1950 and 1960--for white-collar and manual workers separately, and for men and women.

In addition, we calculated industrial mobility between 1950 and 1960, for men by educational level. For this purpose we used the procedures as described by Jaffe and Carleton.[2] The industries were classified into six categories, those in which output per worker increased less than 2 per cent per year during the 1950s, those in which it increased from 2.0 to 3.9 per cent, and those experiencing a 4.0 per cent or more increase. Each of these three groups was then subdivided into two categories: the slower growing industries, i.e., those having employment increases of less than 15 per cent between 1950 and 1960; and the faster growing ones, i.e., employment increased 15 per cent or more.

Most of the men aged 25 and over in 1950 had already completed their formal schooling. On the other hand, there is comparatively little job

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[1] Part 5, pp. 1600-1602.

[2] A. J. Jaffe and R. O. Carleton, Occupational Mobility in the United States, 1930-1960. New York: King's Crown Press, 1954.

mobility among men aged 50 and over (i.e., little in comparison with younger men). Therefore it is pertinent to ask about the mobility of men aged 25 to 49 in 1950. Did the better educated tend to move into the industries in which output per worker increased most rapidly during the 1950s?

We must also note that the numbers of cases in our analyses, derived as they are from one-in-a-thousand samples, tend to be small. We have tried to have a minimum of 200 cases for each distribution which we wish to analyze, although we were not always able to adhere to this limitation. Accordingly, we feel that differences of 1 or 2 or perhaps even 3 percentage points could have resulted from the small number of cases. Hence, the results to be presented should be viewed with this limitation in mind.

II. Findings

More education for everyone

Over the years all segments of the American population are receiving more formal schooling. (This point needs no further elaboration in this paper.) As a result the labor force had more schooling in 1960 than in 1950. The median years of education for employed persons in 1950 and 1960 are as follows:

	1950	1960
Men	9.5	11.0
Women	11.3	12.0

Virtually every occupational group experienced an increase during this period.

The labor force becomes progressively more educated by the simple fact that youngsters who enter have had more schooling than the older workers, especially those who retire. This can be seen as follows:

	Median years of schooling	
	Men	Women
New entries, age 20-24 in 1960	12.3	12.5
Persons who entered between about 1945 and 1955, age 25-34 in 1960	12.2	12.3
Persons in the labor force in 1950 and 1960; i.e., had completed schooling by 1950, age 35-64 in 1960	10.5	11.7
Persons who retired between 1950 and 1960, age 55+ in 1950	8.4	8.9

In the generation or more between the new entries and those who retired, the median number of years of schooling increased by almost four years. This pattern appears for every major occupational group except the professionals; among these workers the median number of years of education has been 16 or more for some time.

Even among laborers who presumably need brawn rather than brain, the median education for male new entries was 11.3 years; this may be compared with the 6.9 years of those who retired since 1950. In short, whether or not American industry really wants workers with more education, it is getting them (Table 1).

Nevertheless, as of 1960, at least half of the employed were "drop outs," persons who had not graduated from high school. Among male professional workers there were virtually none; among managers and other white-collar workers a little over one-third were not high school graduates; and among manual workers, two-thirds or more were "drop outs." Even among employed craftsmen 65 per cent were "drop outs."

Table 1. Median Number of Years of Schooling Completed by Occupation, Age, and Sex, 1960 and 1950: United States

	Males					Females				
	Age 1960				Age 1950	Age 1960				Age 1950
	20,21 New entries	22-24 New entries	25-34	35-64	55+	20,21 New entries	22-24 New entries	25-34	35-64	55+
Professional, Tech. & Kindred Workers	16.3[a]	16.5[b]	16.4	16.3	16.0	16.1[a]	16.0[b]	16.1	16.0	15.5
Farmers & Farm Managers	12.2	12.2	12.1	8.7	8.2	--	11.7	11.6	8.8	8.5
Mgrs., Officials & Props., ex. Farm	12.6	12.8	12.8	12.4	11.1	12.6	12.7	12.5	12.3	11.8
Clerical & Kindred Workers	12.6	12.6	12.6	12.2	10.4	12.6	12.6	12.5	12.4	12.1
Sales Workers	12.7	12.8	12.8	12.4	10.6	12.4	12.3	12.2	11.6	10.1
Craftsmen, Foremen & Kindred Workers	12.2	12.2	12.0	9.8	8.5	12.3	12.3	11.9	10.5	8.9
Operatives & Kindred Workers	12.0	11.6	10.5	8.8	8.2	11.4	11.1	10.4	8.9	8.3
Service Workers	12.3	12.1	11.8	8.9	8.2	12.1	11.6	10.7	8.9	8.4
Farm Laborers & Foremen	10.0	8.7	8.0	6.4	6.0	9.2	9.1	8.8	8.4	7.9
Laborers, ex. Farm & Mine	11.3	10.8	9.3	8.0	6.9	11.7	11.2	10.4	8.7	8.1
TOTAL	12.2	12.3	12.2	10.5	8.4	12.5	12.5	12.3	11.7	8.9

Sources: 1960 Decennial Census, experienced labor force, PC(2)5B, Table 8
1950 Decennial Census, employed persons, PE, No. 5B, Table 11

[a]Age 25-29

[b]Age 30-34

Among employed women about the same proportions of "drop outs" were observed in 1960. Among professional women there were practically none; among managers, officials, and clerical workers about one-third were "drop outs," and among saleswomen about half. Among women manual workers some three-quarters had not graduated from high school.

Education in relation to output per worker

Comparison of the educational levels of employed persons in 1950 and 1960 reveals that there is little, if any, relationship between changes in output per worker and changes in educational levels. This generalization holds true for men and women, and for clerical and sales workers as well as manual workers (Table 2).

Clerical and sales workers. These people had more education than did the manual workers. Further, there may be some question as to the extent to which increases in output per worker may have actually affected these white-collar workers. The most outstanding observation is that those industries which increased in employment most rapidly were the ones which tended to have fewer "drop outs" both in 1950 and 1960.[3] The only exception is found among women employed in industries in which output per worker increased 4 per cent or more per year; among these women there were about the same proportions of "drop outs" in 1960--25 per cent--as among women in fast growing industries but in which output per worker increased under 2 per cent per year.

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[3] Why this is so we do not know. One possibility is that these faster growing industries had been faster growing in earlier decades also, and therefore had attracted more of the younger and better educated workers.

Table 2. Employed Workers by Sex and Broad Occupational Groups, by Educational Attainment and Selected Industry Characteristics, 1950 and 1960: United States

Average annual increase in output per worker and per cent increase in employment, 1950-1960		Men						Women					
		Clerical and Sales			Manual Workers			Clerical and Sales			Manual Workers		
		Total	Not High School grad.	High School grad or more	Total	Not High School grad.	High School grad. or more	Total	Not High School grad.	High School grad. or more	Total	Not High School grad.	High School grad. or more
Increase in Output per Worker under 2%													
Increase in employment under 15%	1950	100	47	53	100	77	23	100	34	66	100	79	21
	1960	100	47	53	100	72	28	100	34	66	100	72	28
Increase in employment 15% or more	1950	100	36	64	100	74	26	100	22	78	100	79	22
	1960	100	37	63	100	68	32	100	24	76	100	74	26
Increase in Output per Worker 2.0 to 3.9%													
Increase in employment under 15%	1950	100	54	46	100	79	21	100	42	58	100	78	22
	1960	100	48	52	100	74	26	100	43	57	100	79	21
Increase in employment 15% or more	1950	100	42	58	100	75	25	100	36	64	100	74	26
	1960	100	35	65	100	68	32	100	35	65	100	68	32
Increase in Output per Worker 4% or more[a]													
Increase in employment under 15%	1950	100[b]	50	50	100	83	17	100[b]	23	77	100	91	9
	1960	100[b]	36	64	100	76	24	100	22	78	100	79	21
Increase in employment 15% or more	1950	100[b]	28	72	100	61	39	100	35	65	100[b]	60	40
	1960	100	25	75	100	50	50	100	25	75	100[b]	60	40
Public Administration[c]	1950	100	34	66	100	65	35	100	17	83	100[b]	17	83
	1960	100	28	72	100	53	47	100	19	81	100[b]	15	85

Source: See text

[a]Excluding agriculture, forestry, and fisheries

[b]Under 200 cases in the sample

[c]Rise in output N.A.

Manual (including service) workers. Among both men and women workers (excluding argiculture), there is little, if any, relationship between changes in educational level (1950 to 1960) and changes in output per worker. Among employed men we find that in those industries in which output per worker increased by less than 2 per cent annually (and employment increased under 15 per cent), 77 per cent of the employed workers were "drop outs" in 1950, as compared with 72 per cent in 1960. At the other extreme, among those industries in which output per worker increased by 4 per cent or more per year (and employment increased under 15 per cent) the proportion of "drop outs" fell from 83 per cent in 1950 to 76 per cent in 1960.

Analysis of data for specific industries reveals exactly the same lack of relationship. For example, in the industry, "local and highway passenger transportation" in which change in output per worker was less than 1 per cent per year, the proportion of "drop outs" remained unchanged, being 76 per cent in 1950 and 75 per cent in 1960. In "printing, publishing, and allied industries" in which changes in output per worker were between 1 and 2 per cent per year, the proportion of "drop outs" fell from 66 per cent in 1950 to 54 per cent in 1960.

On the other hand, in "coal mining" where change in output per worker was over 5 per cent per year, exactly 87 per cent of the employed workers were "drop outs" in 1950 and 1960. In the "chemical and allied products (manufacturing)" in which output per worker was also over 5 per cent per year, 75 per cent of the workers were "drop outs" in 1950 as compared with 59 per cent in 1960.

Among employed women manual workers there is also no indication that increased output per worker rates were related significantly to increases in educational level. The largest increase in education was observed for women in industries in which output per worker increased 4 per cent or more per year. Nevertheless, in 1960 in these industries 79 per cent of the women were "drop outs"; this proportion is as large as, or larger than, any observed in industries with slower rates of increase in output per worker.

For both men and women--perhaps more marked for the men--there was a tendency for industries which grew more rapidly in employment to have somewhat fewer "drop outs" than did the industries in which employment increased less than 15 per cent during the decade. In general, however, even in those industries which apparently were undergoing the most rapid technological changes (as measured by changes in output per worker), half to three-quarters of the manual workers were "drop outs." Clearly, these data do not prove that modern advancing technology necessarily requires that its workers have more formal schooling.

Mobility by education

Is there any evidence that better educated workers moved from industries which experienced small increases in output per worker, to industries which had large increases? It is theoretically possible that there was a significantly large movement of such workers despite the fact that our previous observations showed no particular relation between changes in educational composition and changes in output per worker (between 1950 and 1960). In order to test this we calculated net mobility for men,[4] by

[4]Using the procedures described in Jaffe and Carleton, op. cit.

education and for industries classified by rates of growth in employment and rates of change in output per worker.

This analysis was limited to men between the ages of 25 and 49 in 1950; we calculated their net mobility between 1950 and 1960. The reasons for excluding younger and older men are as follows. Many men under age 25 in 1950 were likely to have continued their formal schooling into the 1950s. To the extent that this happened, the resulting data would not have indicated actual mobility among the several types of industries. Among men over 50, there is comparatively little net mobility; therefore the inclusion of relatively immobile with mobile men would have obscured our analysis.

Even among men 24 to 49 years of age in 1950, a small portion continued their schooling into the 1950s. Hence the actual amount of mobility for the several educational levels (as shown in Table 3) is slightly too great; we extimate that some 4 to 5 per cent of the net mobility shown is the result of continuation of schooling rather than of men shifting from one industry to another.

Agriculture. Employment in this industry decreased between 1950 and 1960, and the average annual rate of change in output per worker was over 4 per cent. Men at all educational levels moved out, although the largest rate of out-mobility[5] was for the "drop out" group--i.e., those who had not completed high school.

Construction. There was about a 13 per cent increase in employment in this industry between 1950 and 1960, and output per worker increased at a rate of between 2.0 and 3.9 per cent per year. There was considerable net in-mobility at all educational levels. The largest absolute net mobility

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[5]Net out-movement as a per cent of the number in that industry and educational level in 1950.

Table 3. Net Mobility of Male Labor Force (Aged 25 to 49), by Education and Type of Industry, 1950 to 1960: United States

(Numbers in thousands)

Ages 25-49	Education							
	Less than High School		High School graduate		Some College or More		Total	
	Mob.	%[a]	Mob.	%[a]	Mob.	%[a]	Mob.	%[a]
Agriculture	-736	-29.9	-130	-25.5	-21	-13.8	-890	-28.5
Construction	+142	+8.6	+30	+7.5	+34	+16.5	+206	+9.2
Public Administration	+97	+19.4	+90	+22.5	+88	+25.9	+274	+22.1
Increase in Output per Worker under 2%								
Increase in employment under 15%	-187	-9.3	-116	-14.8	-86	-20.0	-387	-12.0
Increase in employment 15% or more	+448	+19.4	±0	---	+248	+18.3	+697	+14.1
Increase in Output per Worker 2.0 to 3.9%								
Increase in employment under 15%	-278	-12.4	-136	-16.9	-74	-19.0	-488	-14.2
Increase in employment 15% or more	+400	+19.5	+80	+8.3	+152	+17.5	+631	+16.2
Increase in Output per Worker 4% or more								
Increase in employment under 15%	-258	-22.1	-19	-5.6	+29	+20.1	-249	-15.1
Increase in employment 15% or more	+77	+19.7	+37	+13.0	+85	+40.5	+200	+22.6

Source: See text

[a]Net mobility as a per cent of the numbers in that category in 1950.

was among the "drop outs"--142,000 net in-movement. The largest rate, on the other hand, was among those who had some post-high school education or had graduated from college; there was a net in-movement of some 34,000 such men, for a rate of 16.5 per cent.

Public administration. The total number employed in Federal, State, and local governments (excluding teachers) increased by almost one-third during the decade. We have no information about changes in output per worker for this industry. There was considerable net in-mobility at all educational levels.

Other industries. Almost three-quarters of the men were in the "other" industries; these are classified by changes in output per worker and increases in employment between 1950 and 1960. There was net out-mobility from the slower growing industries--i.e., those in which employment increased by less than 15 per cent between 1950 and 1960--at all educational levels. Conversely, there was net in-mobility at all educational levels, into the faster growing industries. (There is only one exception to this finding; there was net in-mobility among the slower growing industries in which output per worker was 4+ per cent per year, among men who had at least some college.) In short, it was the rate of growth of employment opportunities rather than the rate of technological change that was most important in inducing mobility. And where employment opportunities increased the most, there were opportunities for "drop outs" as well as Ph.D's.

Summary of findings

Our findings conform to those of Bright[6] who analyzed specific jobs in a number of industries, and found that generally the workers needed no more

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[6]James R. Bright, Automation and Management, Harvard University Press, 1958. Cf. Chapter 12, "The Impact of Automation on the Work Force."

schooling after a job was highly mechanized than they had needed before. Sometimes the training time for the new job was longer than it had been for the previous one, but such additional training time was a matter of a few weeks on-the-job. Workers did not have to return to school and get a high school diploma in order to operate or repair the new machines.

Another indication that extensive formal schooling is not required in order to perform most of the jobs associated with modern machines and technology is seen in the fact that technologically modern firms are established in the underdeveloped parts of the world. There they employ relatively unschooled workers for all but the managerial jobs. Clearly, if we are to say that "drop outs" in our society cannot operate modern technology for lack of sufficient education, then we must deny the existence of modern technology in the poorly educated countries of the world. Very likely the poorly educated workers in these countries require longer on-the-job training than may be needed by the better educated American or Japanese or western European workers; if so, this "longer" training is a matter of several weeks or a few months.

III. Some Implications

Insofar as the U. S. economy is concerned, there are plenty of jobs in our economy in which "drop outs" can perform at least satisfactorily enough to hold down the jobs; not less than half the jobs were in this category (in 1960). (Whether "drop outs" earn as much as high school graduates within a given industry and occupation, we cannot say from our present data.) Hence, the higher unemployment rate among "drop outs" of all ages must be attributed to lack of sufficient job vacancies, to discrimination in hiring practices, or to other reasons. Now, since the supply

of labor at all educational levels (except perhaps the very highest) during the 1950s and to the present, is somewhat greater than is the demand, employers can be more selective and do have higher educational requirements (than they have during periods of labor shortage), whether or not such increased schooling is required for the performance of the job.

One study of temporary workers in New York City found that 41 per cent of the personnel men (in the firms surveyed) had a minimum educational requirement; "in the majority of cases they mentioned high school."[7] Most of these temporary workers were hired for "general office work"--i.e., white-collar laborers. What is most significant is that over half of the personnel men were concerned largely with the applicant's previous work experience; if he could do the work he was hired. There was no indication in this study that the personnel men who demanded high school education had jobs which were any different from those in firms in which there was no educational requirement.

It is sometimes argued that in the United States, even though "drop outs" may be able to perform well on many jobs, the types of jobs suitable for them are rapidly disappearing from our economy. It is sometimes said that in another few years "there won't be a laborer left." Some indication of the "rapid disappearance" of such jobs can be seen as follows:

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[7]Federation Employment and Guidance Service, Survey of Practices and Attitudes of Personnel Officers Regarding the Hiring of Temporary and Part-Time Workers, 1964, pp. 11ff. (215 Park Avenue South, New York, N. Y.

	% of employed in manual nonagricultural jobs, April[8]			
	1950	1960	1964	1965
Men	53.5	55.0	53.5	53.7
Women	42.9	40.8	41.6	40.2

	% of employed in clerical and sales jobs, April[8]			
	1950	1960	1964	1965
Men	13.1	14.5	12.7	13.1
Women	36.2	39.8	37.8	39.1

In recent years the large increases have been in professional and technical jobs, for both men and women. Nevertheless, these jobs which generally (but not always) require completion of at least four years of college, include but 1 in 8 of all workers. If in the next generation there should be a tremendous expansion of such professional and technical jobs, this category will still contain not over one-quarter of all workers.

In conclusion, then, we wish to emphasize our belief that education is valuable for its own sake, and we hope that it makes people into better citizens. It is not, however, a mandatory requirement for actually performing the major part of the work in a so-called "modern technological society." Therefore, to sell schooling because "modern technology requires it," especially to those uninterested or unable to continue their education (for whatever reasons), is doing education and the people a grave injustice.

Furthermore, having everyone graduate from high school is not a cure for unemployment. Keeping the economy growing at a sustained rate of at least 5 or 6 per cent per year, year after year (with no relapses) is the only sure cure for unemployment.

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[8]Data from U. S. Decennial Censuses, adjusted for occupation not reported, and from the U. S. Department of Labor Employment and Earnings monthly.

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9. Conclusions and implications

The conclusions available for the most part relate to trends in college going and some of the factors which might influence such trends. The major conclusion was that through the early 1960s a relatively constant proportion of all high school graduates had entered college. This proportion is on the order of half the white males and 4 in 10 for nonwhite males and all females. The big increases in college enrollment in the past decade or two can be accounted for by increases in the number of persons of high school graduation age, together with increases in the proportion who graduated from high school. Hence the universe of potential college entrants increased considerably.

For at least the last couple of decades (for which we have information) parents have always wanted their children to go to college; this causal factor (if we so wish to call it) seems to have been a constant.

Another factor which seems to have been a constant, at least into the early 1960s, is that of the socio-economic position of the family. In the past and at present, a much larger proportion of the children of white-collar and richer families than of manual worker and poorer families go on to college. During the last couple of decades there have been very significant increases in the number of families having white-collar workers, especially professionals and managers, and in average family income. Accordingly, as of the early 1960s, there were significantly more families of the type that were most likely to send their children to college; presumably this factor also tended to increase college enrollment.

Another element, which has risen recently and which may be bringing some new aspects into college going, is the growth of the free (or almost

free) two-year public college. There has been a very considerable increase in the number of such colleges, and by the early 1960s about a quarter of all new entrants into college had enrolled in two-year colleges. By reducing the cost of college going (both to the society which provides the colleges and to the individual who may have to spend some of his own money for attending college), and by reducing the educational requirements for college entrance, the end result may be that significantly more than half of the high school graduates in future years may enter college.

The above remarks have implications for future college enrollment. As was discussed in the article, "Who Are the Two- vs. the Four-Year College Entrants?" it is very clear that a dual college system is emerging. In the future large numbers are likely to have only one or two years of college in a two-year college; large numbers will start at four-year colleges but drop out before they get the first baccalaureate degree; and of course a number will continue even beyond the first baccalaureate. Accordingly, in trying to make projections, we have to distinguish as a minimum between two- and four-year colleges.

As far as two-year colleges are concerned, at this date projections seem to be impossible, since to a very large extent the opening of new two-year colleges is largely a matter of local community sentiment and a question of how much money the city or state wishes to spend. At this time there are very few exceptions to the "open door" admission policy of two-year public colleges. Tuition is nominal or nonexistent; in some cases even a high school diploma is not required for entrance. Furthermore, the student is under little pressure to get good grades unless he plans to transfer to a four-year college. Also, if free commuter two-year colleges were to become

yet more widespread in local communities, to that extent they would tend to enroll an increasingly large neighborhood clientele.

With regard to four-year colleges and universities, however, our prognosis of future attendance is much more conservative. There is no indication in any of the historical data which we have reviewed, nor in the attitudes of the students and their parents, that many more than 5 in 10 of the white male high school graduates and 4 in 10 of all the other high school graduates will enter four-year higher institutions.

Since high school graduation is a prerequisite to enrollment in a four-year college, however, the population of potential four-year college goers will increase as the number and proportion who graduate from high school increase. In this respect, over two-thirds of all whites now graduate from high school; this proportion is likely to increase only moderately within the next decade or so, perhaps to 70 per cent or a little over.

Among nonwhites, less than half now graduate from high school. It appears from the data that the rate of high school graduation among nonwhites has lagged behind that of whites by about one generation. Accordingly we may infer that there will be significant increases within the next decade or two in the proportion of nonwhites who graduate from high school. Among this group the proportion will perhaps approach two-thirds by 1975.

(From other data in our study, it seems that this has been true for all educational levels--grammar school, high school, and college. In all instances, nonwhite graduates trailed white graduates by about a generation. Consequently, as educational attainment rose successively at the various levels, the relative position of the two racial groups remained essentially unchanged.)

During the next decade or two there will continue to be substantial increases in the numbers of people of high school graduation age--those 15 to 19 years old. The number is expected to rise from 13.4 million in 1960 to about 20.5 million in 1975.

Combining the increase in population size with the projected proportions graduating from high school and entering four-year colleges, we suggest the following possibilities by 1975:

The annual number of high school graduates could be just under 3 million (an increase of 1 million over the 1960 figure).

The annual number of first-time students enrolled in four-year colleges could be about 1.1 million (an increase of about .4 million over the 1960 number).

The total number enrolled in four-year colleges and universities could be about 5 million (an increase of about 1.8 million over the number of students in 1960).

How accurate are these projections? We are confident of the projected number of high school graduates for two reasons. There is little doubt about the increase in the numbers of persons of high school age, and it has become customary--frequently mandatory--for all these young people to attend a high school.

The total number of students in four-year colleges and universities, however, will depend on the availability of staff and buildings, and the extent to which public pressures and rewards induce the large numbers of apparently qualified youngsters who do not now go to a four-year college to do so in the future. Summarizing, we feel that the numbers of students could easily fail to reach the total of 5 million projected above for 1975,

through appropriate and well-timed inaction. The extent to which it might be increased above 5 million, however, is much more difficult to prognosticate.

As for the relationship of educational attainment and modern technology, our major conclusion was to the effect that the unemployment among the poorly educated cannot be attributed (as is often done in the popular press) to their inability, because of a lower level of education, to actually perform the work required by modern technology. The evidence is clear that there are great numbers of jobs which require comparatively little formal education. Since the American economy has not been growing rapidly enough, the over-all demand for workers, especially for lower white-collar and manual workers, has not kept pace with the supply of such persons who could perform such jobs. Hence employers, having more applicants than jobs, are able to select. Since formal education is a convenient criterion to apply, personnel men have often insisted on a minimum of high school education, and sometimes even college graduation, without reference to the actual requirements of the job itself.